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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/549,952	09/25/2006	Urban Eriksson	15436.861.2a.1	1348
22913 7590 03/08/2007 WORKMAN NYDEGGER (F/K/A WORKMAN NYDEGGER & SEELEY) 60 EAST SOUTH TEMPLE 1000 EAGLE GATE TOWER SALT LAKE CITY, UT 84111			EXAMINER PRINCE, KAJLI	
			ART UNIT 2874	PAPER NUMBER
SHORTENED STATUTORY PERIOD OF RESPONSE			MAIL DATE	
3 MONTHS			03/08/2007	
			DELIVERY MODE PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/549,952

Applicant(s)

ERIKSSON ET AL.

Examiner

Kajli Prince

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS; WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☒ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 September 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 20 September 2005.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: ____.

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. §119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

The prior art documents submitted by applicant in the Information Disclosure Statement filed on 20 September 2005 have all been considered and made of record (note the attached copy of form PTO-1449).

Drawings

Eight (8) sheets of formal drawings were filed on 20 September 2005 and have been accepted by the Examiner.

Specification

Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

1. Claims 4-5 and 9-10 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim should refer to other claims in the alternative only, and/or may not depend from any other multiple dependent claims. See MPEP § 608.01(n).

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3 and 6-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Liu (US 4,468,086).

4. Consider claims 1-3 and 6-8, Liu discloses the claimed invention,

[a]n optical modulator, divided into at least two active segments separated by at least one passive segment, the modulator comprising: an optical waveguide with an optical group index (n_o) having an optical signal propagating at an optical velocity (v_o), and a microwave transmission line with an electrical propagation index (n_p), having an electrical signal propagating at an electrical velocity (v_e), wherein the electrical propagation index (n_p) of the unloaded microwave transmission line is lower than the optical group index (n_o) of the optical waveguide, characterized in that the loading and length of the microwave transmission line are adjusted for a specific Bloch impedance and electrical velocity (v_e);

characterized in that the electrical velocity (v_e) in the adjusted microwave transmission line is substantially equal to the optical velocity (v_o) in the optical waveguide;

characterized in that the length of the microwave transmission line from the center of one active segment to the center of the adjacent active segment is longer than the length of the corresponding optical waveguide from the center of one active segment to the center of the adjacent active segment; and

[a] method for adapting the impedance in an optical modulator which is divided into at least two active segments separated by at least one passive segment, wherein the modulator comprises: and optical waveguide with an optical group index (n_o) having an optical signal propagating at an optical velocity (v_o), and a microwave transmission line with an electrical

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propagation index (n_p), having an electrical signal propagating at an electrical velocity (v_e), wherein the electrical propagation index (n_p) of the unloaded microwave transmission line is lower than the optical group index (n_o) of the optical waveguide, characterized by adjusting the loading and length of the microwave transmission line for a specific Bloch impedance and electrical velocity (v_e);

characterized by adjusting the loading and length of the microwave transmission line in such a way that the electrical velocity (v_e) in the adjusted microwave transmission line becomes substantially equal to the optical velocity (v_o) in the optical waveguide;

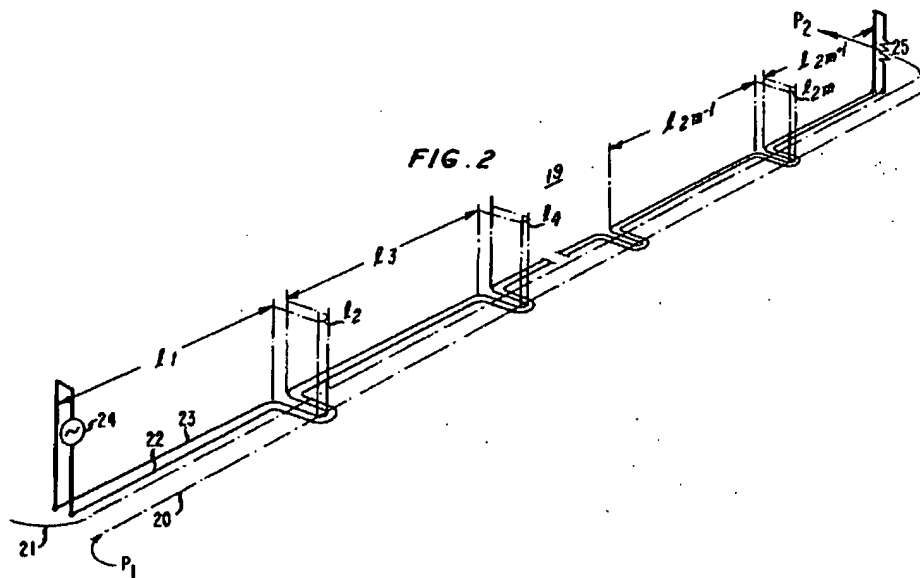
characterized by adjusting the length of the microwave transmission line in such a way that the length from the center of one active segment to the center of the adjacent active segment becomes longer than the length of the corresponding optical waveguide from the center of one active segment to the center of the adjacent active segment.

Liu discloses a means for controlling the transfer of signal power between coupled waveguides in a traveling way, velocity mismatch device by snapping the electrical signal wavepath so that interaction between the electrical and optical circuits occurs along selected intervals of the electrical circuit. (Abstract, column 3 lines 41-46, claim 1). A modulating signal source (24) is connected at the input end of the electrical signal path, and a terminating resistor (25), *equal to the characteristic impedance of the path*, is connected at the other end. As indicated hereinabove, the electrical signal path includes both regions which bend away from the optical waveguides so as to preclude any interaction, and regions which are aligned with the optical wavepath so as to produce the desired interaction. (column 3 lines 59-68, Fig. 2 – see

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below). Thus, Liu teaches adjusting the microwave transmission line, so that it is longer than the optical transmission line, in order to achieve velocity matching.

The regions where the two signal wavepaths intersect make up the active segments and are denoted on Fig. 2 as (l_2, l_4). The regions where the electrical wavepath bends away from the optical wavepath produce passive segments and are denoted on Fig. 2 as (l_1, l_3).



Further, any transmission line with a length would inherently have a Bloch impedance and electrical velocity. Liu teaches a line with a length, thus it inherently has a Bloch impedance and electrical velocity.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

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having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. **Claims 4-5 and 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu (US 4,468,086) in view of Lam et al. (US 2003/0147574 A1).**

9. Consider claims 4-5 and 9-10, Liu substantially discloses the claimed invention as applied above.

However, Liu does not disclose a microwave transmission line or an electroabsorption optical modulator.

The added secondary reference to Lam et al. further discloses,

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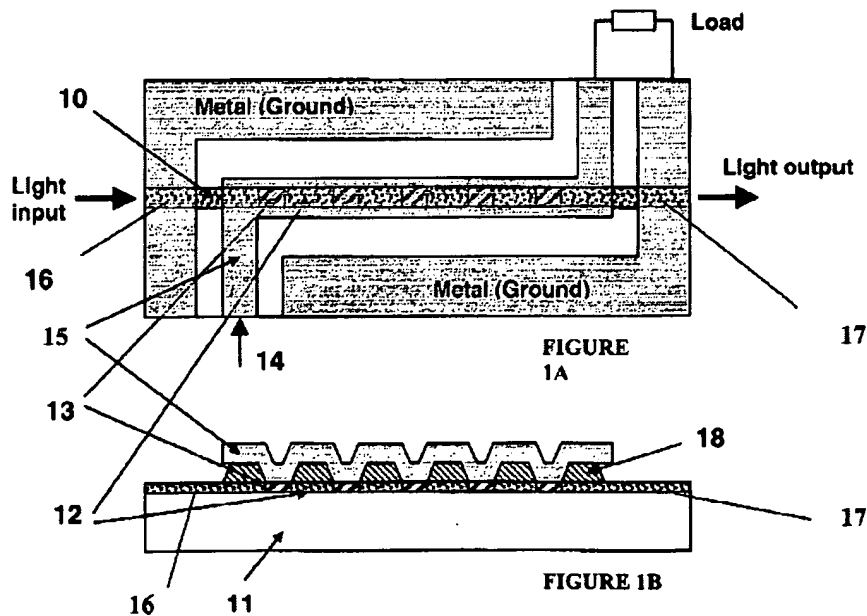
characterized in that the active segment of the optical modulator is a microwave transmission line and is cascaded in series with the microwave transmission line of the passive segment,

characterized in that the optical modulator is an electro-absorption modulator,

characterized by implementing the active segment of the optical modulator as a microwave transmission line and cascading it in series with the microwave transmission line of the passive segment, and

characterized by the optical modulator being an electro-absorption modulator.

Lam et al. teaches an optical modulator, comprising an optical waveguide (10) with distributed electroabsorption (EA) regions (13), which can be activated by a microwave signal (14) applied to a metallic transmission line (15) located above the waveguide. (Detailed Description: paragraph 30, Fig. 1A, 1B – see below).



The microwave transmission line allows good overlap of the modulation field with the EA region, permitting high speed operation with good modulation characteristics. (Background: paragraph 6 lines 7-10). One approach to the problem of velocity matching has been to use a TW-EAM having several discrete EAM regions. In this way a transmission line can be fabricated, overlapping these regions, whereby the microwave signal follows a longer path than the optical signal, thus enabling velocity matching. (Background: paragraph 6 lines 14-19).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the optical modulator taught by Lam et al., in the optical modulator taught by Liu, for the benefit of improved optical fibre based communication. (Background: paragraph 3 lines 1-4).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following references are pertinent to the state of the art: Marcatili (US 4,380,364), Alferness et al. (US 4,553,810), and Betts (US 6,310,700 B1). These references pertain generally to both standing and traveling wave electro-optic and electro-absorptive devices that shape the electrical signal path in order to match the velocity of the electrical and optical signals.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kajli Prince whose telephone number is (571) 270-1280. The examiner can normally be reached on Monday-Thursday, 6:00am to 4:00pm (EST).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on (571) 272-2344. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Kajli Prince

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PRIMARY EXAMINER
3/5/07